



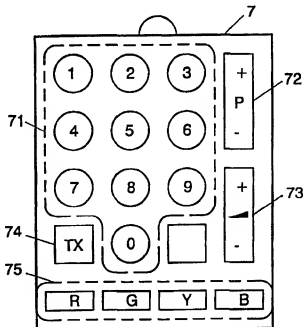
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(54) Title: BROADCAST RECEIVER

(57) Abstract

A receiver is disclosed which is conventionally tuned to a desired channel by entering a user-defined program number (71) or operating a program up/down key (72) on a remote control device (7). The remote control further includes favorite channel keys (75) being positioned in such a way that they can be found by touch. A program number can be dynamically assigned to any one of said favorite channel keys. The user can thus easily "zap" between the channels he is currently interested in, without having to enter the respective program numbers or even look at the remote control device.



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Broadcast receiver.

FIELD OF THE INVENTION

The invention relates to a broadcast receiver, for example, a television or radio receiver, comprising:

- a tuner for tuning the receiver to one of a plurality of receivable broadcast channels;
- 5 - a memory having first memory locations for storing tuning data representing said receivable channels;
- user-operable input means having channel selection means for selecting one of said first memory locations; and
- a control circuit coupled to the tuner, input means and memory, for applying the tuning
10 data stored in a selected one of said first memory locations to the tuner.

The invention also relates to a remote control device for controlling a broadcast receiver.

BACKGROUND OF THE INVENTION

15 Broadcast receivers as defined in the opening paragraph are generally known. Television receivers, for example, comprise a tuning memory in which a tuning voltage or a channel number is stored, representing the television channels that the user may wish to select. The receiver is tuned to a desired broadcast channel by entering a one or two-digit number on a numeric keypad. Said number is then used to address the memory location in which the
20 tuning data for the desired channel is stored. In this manner, each receivable channel is assigned a user-defined number, usually referred to as "program number" or "preset number". Generally, the known receiver also includes an up/down key for increasing and decreasing the preset number.

25 Television viewers often switch from one channel to one or more other channels in order to skip commercials, keep track of sports results while watching a show, scan whether the transmission of a soap series has started, or the like. This "zapping" requires the user to know and enter the preset number of the channel he temporarily wants to switch to. This is no problem as long as the number of receivable channels is small. However, as the number of receivable channels (and thus the number of presets) increases, it is more difficult

to remember and enter the preset numbers of the few channels that the user is currently interested in. Some known receivers include a "last program" button, by means of which the user can toggle between the current channel and one or more recently selected channels.

OBJECT AND SUMMARY OF THE INVENTION

It is an object of the invention to provide a receiver with which a user can easily zap between currently interesting channels.

To this end, the receiver is characterized in that

- the input means include two or more favorite channel selection keys;
- the memory includes two or more further memory locations each being selectable by one of said favorite channel selection keys;
- the control circuit is arranged to store channel selection data representing a favorite channel selected by the channel selection means in a selectable one of said further memory locations, and tune the receiver to a favorite channel in response to operation of the corresponding favorite channel selection key.

It is thereby achieved that the user can dynamically and temporarily assign two or more currently favorite channels to respective favorite channel selection keys, without thereby changing the existing allocation of preset numbers. The receiver can then directly be tuned to a favorite channel by pressing the corresponding key. Assuming that the user assigned the favorite channel keys very recently, the key to be pressed can easily be found by touch.

International Patent Application WO-A-97/32434 discloses a television receiver with one favorite channel button. This receiver is not of the type defined above, but is normally tuned by entering channel numbers. In contrast to preset numbers, channel numbers are fixedly determined by the network and cannot be defined by the user. In order to provide an alternative way of accessing channels, a currently selected channel can be added to or removed from a list of favorite channels. The user can then cyclically zap through said list of favorite channels by using the favorite channel selection button. The receiver does not facilitate direct access to two or more favorite channels by respective individual keys.

The channel selection data representing a favorite channel can be stored in the form of tuning data (i.e. as tuning voltage or channel number). In that case, the tuning data to be stored is copied from the selected first memory location. The channel selection data can also be stored in the form of the address (i.e. the preset number) of the respective first memory location. In that case, the receiver is tuned to a favorite channel by using the stored preset number to address the first memory location where the tuning data is stored. The latter option

can be used particularly advantageously in remote control devices. In response to pressing a favorite channel key, the device will transmit the preset number of the favorite channel. In this manner, the invention can be used in combination with conventional receivers.

The process of assigning a favorite channel to a favorite channel key should be easy, user-friendly and evident. To this end, a favorite channel key is programmed in response to conventional channel selection within a predetermined period of time after the favorite channel key has been pressed. Alternatively, a currently selected channel is programmed to be a favorite channel in response to keeping the favorite channel key pressed for a predetermined period of time.

In a preferred embodiment, the receiver is of a type having a teletext operation mode and comprising colored keys for accessing predetermined teletext pages in said teletext operation mode, characterized in that said colored keys act as said favorite channel keys if the receiver is not in said teletext operation mode. In such a preferred embodiment, no keys have to be physically added, and the user can easily associate a color with a currently programmed favorite channel.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows schematically a diagram of a television receiver in accordance with the invention.

Fig. 2 shows a top view of a remote control transmitter which is shown in Fig. 1.

Figs. 3A and 3B show formats of a tuning memory which is shown in Fig. 1.

Figs. 4 and 5 show flow charts to illustrate the operation of the receiver which is shown in Fig. 1.

Fig. 6 shows a schematic diagram of a remote control transmitter in accordance with the invention.

Fig. 7 shows a flow chart to illustrate the operation of the remote control transmitter which is shown in Fig. 6.

DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 shows schematically a diagram of a television receiver in accordance with the invention. It will be appreciated, however, that the invention can be applied in other receivers such as radio receivers or multimedia stations.

The television receiver comprises a tuner 1 for receiving a terrestrial or cable multi-channel signal, a signal processor 2, a reproduction unit 3, a control circuit 4 in the form of a microprocessor, a tuning memory 5, a remote control receiver 6 and a remote control transmitter 7. An additional keyboard (not shown) may be fixedly connected to the receiver.

Fig. 2 shows a layout of the remote control transmitter 7. The transmitter comprises conventional program selection means in the form of a numeric keypad 71 and a program up/down key 72, and further includes a volume up/down key 73, a teletext on/off key 74, and a group of colored buttons 75, here labeled R (red), G (green), Y (yellow) and B (blue). The transmitter 7 is conventional in the sense that, upon pressing a key, it transmits an infrared signal identifying said key.

Figs. 3A and 3B show possible formats of the tuning memory 5 in accordance with the invention. The memory has $N+4$ memory locations. More particularly, the memory has N first memory locations labeled $1, 2, \dots, N$ and four further memory locations labeled R, G, Y and B. In the embodiment shown in Fig. 3A, both the first and further memory locations store tuning data TD in the form of a network channel number. In the embodiment shown in Fig. 3B, the first memory locations $1..N$ store tuning data TD, whereas the further memory locations R, G, B, Y store the address n ($n=1..N$) of a first memory location. In both examples, the red key is currently assigned to channel 22 (preset 4), the green key to channel 43 (preset 1), and the yellow key to channel 61 (preset 17).

The operation of the receiver will now be described with reference to a flow chart of operation steps which is shown in Fig. 4. It will be assumed that the tuning data of the receivable channels have already been stored in respective first memory locations $M(1)..M(N)$ of the tuning memory. In a first step 401, which is executed when switching on the receiver, the control circuit assigns an initial value 1 to a preset number n , reads the tuning data stored in memory location $M(1)$, and applies said tuning data TD to the receiver's tuner. The receiver is thus tuned to the channel having the preset number 1 (i.e. channel 22). The control circuit then awaits, in a step 402, user commands generated by the remote control device.

In a step 403, the controller checks whether the user has pressed the teletext button 74 (see Fig. 2). If that is the case, the receiver is switched to a teletext operation mode in which a teletext control program 404 is active. In the teletext mode, the channel selection keys 71 and the program up/down key 72 are used for teletext page selection. In addition, pages can be selected by the colored keys 75. The page numbers associated with the colored keys are defined by the teletext service, correspondingly colored keywords being displayed on

screen. The teletext control program 404 is left, and the control circuit returns to the step 402, when the teletext key 74 is pressed again.

In a step 405, the control circuit checks whether the user entered a preset number n by means of the numeric keypad 71 of the remote control device. The number may comprise 1, 2 or even 3 digits. When a preset number n has been entered, the control circuit performs a step 406, in which the tuning data TD stored in memory location $M(n)$ is applied to the tuner. The receiver is thus tuned to the channel defined by the contents of memory location $M(n)$. A channel can be similarly be selected by pressing the program up/down key (step 407). This causes the current preset number to be increased or decreased by one (step 408).

In a step 409, the control circuit checks whether the user pressed one of the colored keys 75. The respective color (red, green, yellow or blue) is denoted c . When the user has pressed one of the colored keys, the control circuit performs a step 410, in which the tuning data TD stored in the corresponding further memory location $M(c)$ (i.e. $M(R)$, $M(G)$, $M(Y)$ or $M(B)$ in Fig. 3) is applied to the tuner. The receiver is thus tuned to one of the favorite channels assigned to the colored keys.

In response to pressing one of the colored keys, a timer t is started in a step 411. Every time the user selects a channel in a conventional manner as described above with reference to the steps 405-408, the control circuits checks in a step 412 whether a predetermined period of time T timer has lapsed after said timer was started. If the conventional channel selection has been carried out within said time period T , the selected channel will be assigned to the colored key that was just pressed. To this end, the control circuit copies the tuning data of the selected channel from first memory location $M(n)$ to the further memory location $M(c)$ in a step 413. In this manner, a favorite channel can easily be assigned to each of the colored keys. It is sufficient to 'manually' select the desired channel within, say, 3 seconds after pressing the respective colored key.

Fig. 5 shows the flow chart of operations of an alternative embodiment. This embodiment differs from the one shown in Fig. 4 in that the way of assigning favorite channels to the colored keys is different. Same numerals denote identical functions. In the embodiment, which is shown in Fig. 5, a step 414 checks whether a colored key is being pressed for more than a predetermined period of time. If the key is pressed for a short period of time, the receiver tunes to the corresponding favorite channel (step 410). If the key is pressed for a longer period of time ($>T$), the currently selected (and displayed) channel is assigned to be a favorite channel (step 413).

In both embodiments, the tuning memory is assumed to have the format which is shown in Fig. 3A. It will be appreciated that the actual implementation of steps 410 (tuning the receiver in response to a colored key) and 413 (assigning a favorite channel to a colored key) is slightly different if the format shown in Fig. 3B is used.

5 Fig. 6 shows a schematic diagram of a remote control transmitter in accordance with the invention. A conventional television receiver can be controlled with the remote control transmitter in such a way that the receiver has the same features as described above. The transmitter comprises a keyboard 61 (having the layout shown in Fig. 2), a control circuit 62, an infrared signal transmitter 63, and a memory 64. The memory comprises four memory
10 locations labeled R, G, Y and B, each of which can store a preset number.

Fig. 7 shows a flow chart to illustrate the operation of the transmitter. In a step 701, the keyboard is scanned. In a step 702, the control circuit determines whether the pressed key is one of the digits 0..9 on the numeric keypad (71 in Fig. 2). In that case, the infrared signal for the digit d is transmitted in a step 703. If more digits are pressed successively within
15 a predetermined period of time, said digits are assumed to constitute a preset number n. Said number is composed in a step 704. The control circuit then returns to the scanning step 701.

In a step 705, it is checked whether the program up/down key (72 in Fig. 2) was pressed. In that case, the current preset number n is increased or decreased by one (step 706), and the digits constituting the new preset number are transmitted (step 707).

20 In a step 708, the control circuit determines whether one of the colored keys (75 in Fig. 2) has been pressed and, if that is the case, whether said key is being pressed for more than a predetermined period of time T (step 709). If the key is pressed for a short period of time, the device transmits (step 710) the digits constituting the preset number which is stored in memory location M(c) of memory 64, where c is the color (R, G, Y or B) of the colored
25 key. In response thereto, the receiver will be tuned to the corresponding favorite channel. If the colored key is pressed for a longer period of time ($>T$), the current preset number n is stored (step 711) in the memory location M(c). The current channel is thus programmed to be a favorite channel and will now also be accessible by the respective colored key. If any other key is pressed, such as volume up/down, the corresponding infrared signal is transmitted in a
30 step 712.

In summary, a receiver is disclosed which is conventionally tuned to a desired channel by entering a user-defined program number (71) or operating a program up/down key (72) on a remote control device (7). The remote control further includes favorite channel keys (75) being positioned in such a way that they can be found by touch. A program number can

be dynamically assigned to any one of said favorite channel keys. The user can thus easily "zap" between the channels he is currently interested in, without having to enter the respective program numbers or even look at the remote control device.

CLAIMS:

1. A broadcast receiver, comprising:
 - a tuner for tuning the receiver to one of a plurality of receivable broadcast channels;
 - a memory having first memory locations for storing tuning data representing said receivable channels;
- 5 – user-operable input means having channel selection means for selecting one of said first memory locations; and
- a control circuit coupled to the tuner, input means and memory, for applying the tuning data stored in a selected one of said first memory locations to the tuner;
- characterized in that
- 10 – the input means include two or more favorite channel selection keys;
- the memory includes two or more further memory locations each being selectable by one of said favorite channel selection keys;
- the control circuit is arranged to store channel selection data representing a favorite
- 15 locations, and tune the receiver to a favorite channel in response to operation of the corresponding favorite channel selection key.
2. A receiver as claimed in claim 1, wherein the channel selection data which the control circuit stores in the selected further memory location is the tuning data stored in the
- 20 selected first memory location.
3. A receiver as claimed in claim 1, wherein the channel selection data which the control circuit stores in the selected further memory location is the address of the selected first memory location.
- 25 4. A receiver as claimed in claim 1, wherein the control circuit performs said storing of data in the selected further memory location in response to operation of the first channel selection means within a predetermined period of time after operation of the respective favorite channel key.

5. A receiver as claimed in claim 1, wherein the control circuit performs storing of data representing a currently selected channel in a selected further memory location in response to keeping the respective favorite channel key pressed for a predetermined period of time.

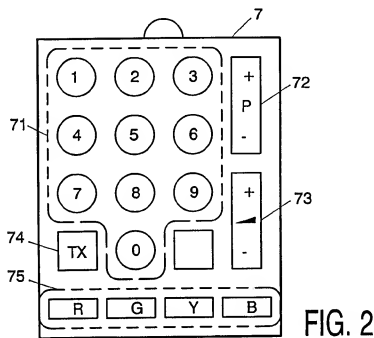
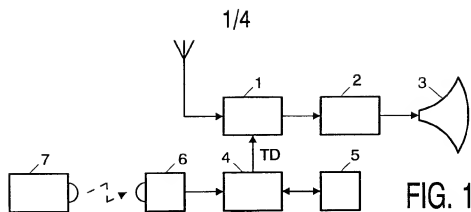
6. A receiver as claimed in claim 1, wherein said first channel selection means are formed by a numeric keypad.

7. A receiver as claimed in claim 1, further having a teletext operation mode and comprising colored keys for accessing predetermined teletext pages in said teletext operation mode, characterized in that said colored keys act as said favorite channel keys if the receiver is not in said teletext operation mode.

8. A remote control unit for controlling a broadcast receiver, comprising:

- channel selection means for generating channel selection data for tuning the receiver to one of a plurality of receivable broadcast channels;
- transmitting means for transmitting said channel selection data to said broadcast receiver; characterized in that the remote control further includes:
 - two or more favorite channel selection keys
 - two or more memory locations each being selectable by one of said favorite channel selection keys;
 - a control circuit being arranged to store channel selection data representing a favorite channel and selected by the channel selection means in a selectable further memory location, and transmit said stored channel selection data to the receiver in response to operation of the corresponding favorite channel selection key.

9. A remote control unit as claimed in claim 8, further comprising colored keys for accessing predetermined teletext pages in a teletext operation mode, characterized in that said colored keys act as said favorite channel keys if the remote control is not in said teletext operation mode.



n	TD
1	CH43
2	CH07
3	CH15
4	CH22
5	CH04
N	CH19

R	CH22
G	CH43
Y	CH61
B	CH--

FIG. 3A

n	TD
1	CH43
2	CH07
3	CH15
4	CH22
5	CH04
N	CH19

R	n=4
G	n=1
Y	n=17
B	-

FIG. 3B

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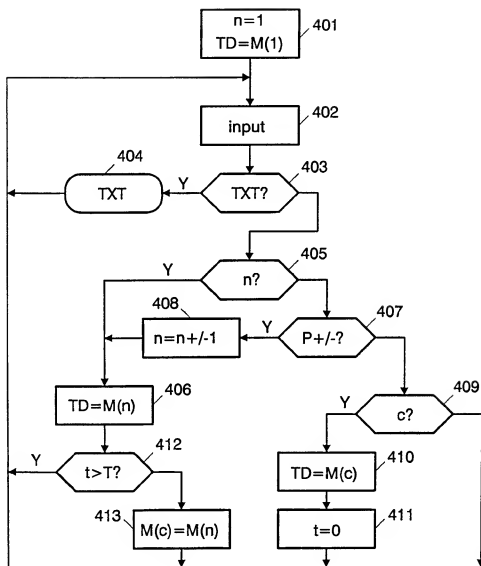


FIG. 4

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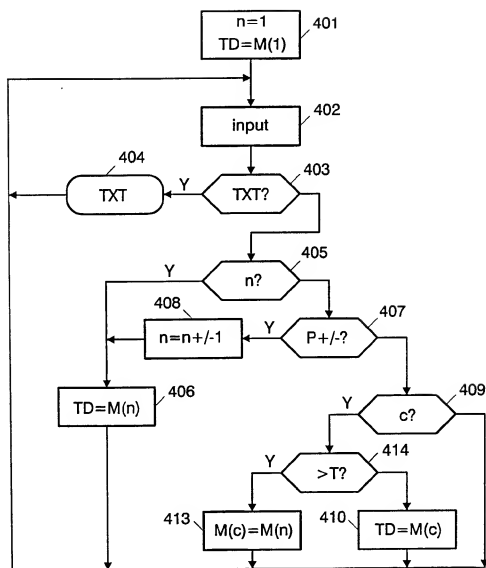


FIG. 5

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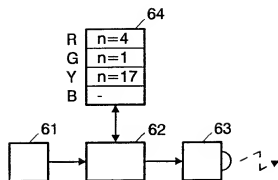


FIG. 6

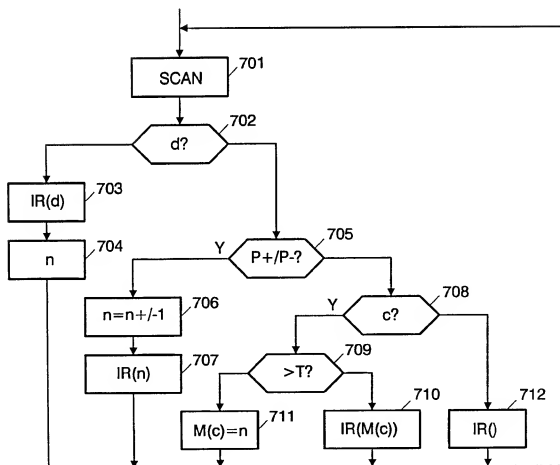


FIG. 7